

## High Efficiency Lightweight Radiators, Phase I

Completed Technology Project (2004 - 2005)



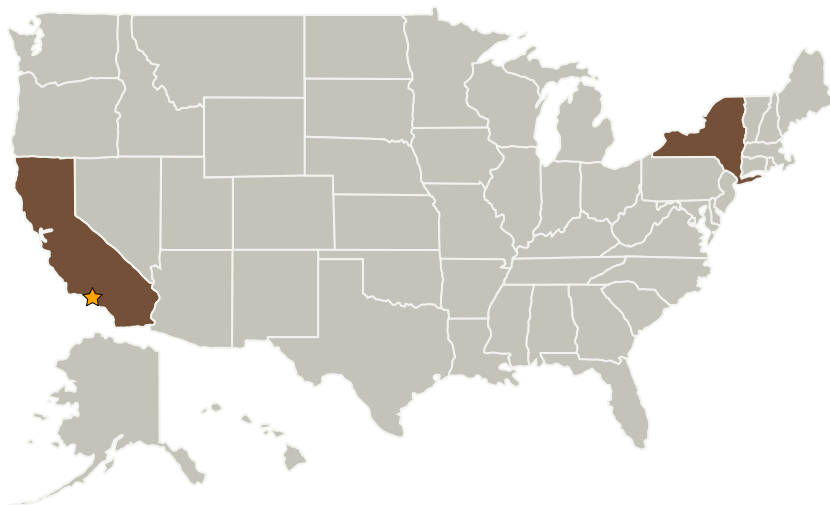
## Project Introduction

XC Associates proposes to build on prior work to develop and characterize a very high efficiency, lightweight radiator constructed from high thermal conductivity carbon fibers. The radiator will be suitable for use on instruments carried by future spacecraft. The phase I effort will address the thermal performance and size limitations of the composite design. Since cryogenic applications are becoming more common the thermal characteristics of the radiator will be measured down to 45K. Modern spacecraft thermal control needs to be low mass and low cost. Composite thermal radiators will realize a greater than 60% weight saving compared to aluminum and the costs can be addressed by the use of standard technology that can be easily applied to new designs. The major innovation to be demonstrated by this project is the use of highly orientated fibers that completely eliminates the low through thickness thermal conductivity normally associated with traditional carbon fiber laminates. This highly oriented lay-up also allows the thickness of the radiator to be tapered down to less than 0.020" while retaining very high stiffness. Therefore, the radiator is much thinner than the equivalent aluminum radiator, which combined with lower density of composite construction, accounts for the significant weight reduction.

## Anticipated Benefits

The lightweight radiator will have direct application for cooling of instruments and spacecraft. The technology also has significance for thermal management of missiles and radar systems. The lightweight radiator will have direct application for cooling of instruments and spacecraft.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
XC Associates, inc	Supporting Organization	Industry	stephentown, New York

Primary U.S. Work Locations	
California	New York

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Manager:**

Celestino Jun Rosca

**Principal Investigator:**

John Bootle

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - └ TX14.2 Thermal Control Components and Systems
    - └ TX14.2.3 Heat Rejection and Storage